REMARKS

Examiner Interview:

Applicants thank the Examiner for the courtesies extended to their representative, Chung Park, during the telephone interview on May 16, 2006. During the interview, the claim rejections under 35 U.S.C. §101 and 35 U.S.C. §112 of the Office Action mailed on March 28, 2006 have been discussed.

With regard to the claim rejection under 35 U.S.C. §101, the Examiner indicated that the term "infrared" in paragraph [0023] can be interpreted as "carrier wave," where carrier wave is non-statutory subject matter. As discussed below, paragraph [0023] has been rewritten to address the rejection. With regard to the claim rejection under 35 U.S.C. §112, the Examiner indicated that the term "bisection error" needs to be redefined in the specification. Based on the representative's explanation of the term, it was agreed that the rejection would be overcome by describing the term in light of its conventional definition in the art, and preferably by providing evidence that describes the conventional bisection iteration method.

The Claims

Claims 1-30 are currently pending. Claims 1, 4, 8, 12, 16, 22, and 25 have been amended to clarify them. Applicants respectfully request reconsideration of the application in response to the non-final Office Action.

Claim Rejections – 35 USC §101

The Office has stated that "the specification discloses 'carrier wave' as communication media (p. 6, paragraph 0023). Carrier wave is non-statutory subject matter." To address the rejection, paragraph [0023] has been rewritten and includes a non-exhaustive list of examples of the computer-readable medium. Applicants respectfully submit that the amended specification does not include any non-statutory subject matter and request the rejection be withdrawn.

Claim Rejections – 35 USC §112

Claims 1-30 have been rejected under 35 USC §112, first paragraph, as allegedly failing to comply with the enablement requirement.

In rejecting claims 1, 16, and 26, the Office has stated "the claims contain the term 'prime criterion parameter,' which is defined as 'a bisection error of the circuit simulation' (paragraph 0012), is indefinite because the specification does not clearly redefine the term. Claims 2-15, 17-25, and 27-30 have been rejected because they inherit the defects of claims 1, 16, and 26, respectively.

As discussed in the phone interview, a conventional bisection iteration method (or, shortly bisection method) works by repeatedly dividing an interval in half at each iteration step and then selecting the subinterval in which the target solution exists. In the bisection method, as added to the paragraph [0023], the term "bisection error" represents a half of the difference between the minimum and maximum values of the interval at each iteration step. The attached appendix describes a typical bisection method in the art. As described in the attached documents, the absolute error for the bisection method (or, equivalently, bisection error) after n steps is $|b-a|/2^n$. Alternatively, the bisection error can be defined as the difference between the minimum and maximum values of the interval at each iteration step. As depicted in FIGS. 1-8 of the present application, the presently claimed subject matter is based on, *inter alia*, a bisection method. As such, no new matter has been introduced by the change in paragraph [0023]. Applicants respectfully submit that the rewritten paragraph [0023] includes a clear definition of the term "bisection error," and as such, claims contain subject matter that is described in the specification. Accordingly, Applicants respectfully request the rejection of claims 1, 16 and 26 be withdrawn. Dependent claims 2-15, 17-25 and 27-30 depend from claims 1, 16, and 26, respectively, rendering them also patentable.

Claims 1-30 have been rejected under 35 USC §112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In rejecting claims 1, 16, 26, the Office has stated that "the specification does not clearly redefine the term 'prime criterion parameter,' which is defined as a 'bisection error of the circuit simulation' (paragraph 0012). Applicants repeat the argument with regard to the definition of the term "bisection error."

Furthermore, in rejecting claim 1, the Office has stated that "the limitation 'calculating a prime criterion parameter based on the optimization parameters and the signal characteristic value' is unclear of which optimization parameters are used for the calculation since there are 3 optimization parameters available."

Claim 1 has been amended to include a recitation "calculating a prime criterion parameter based on the current minimum and maximum optimization parameters and the signal characteristic value." Support for the change can be found in the specification, at page 6, paragraph [0025]. Applicants respectfully submit that the change makes it clear on how to calculate the prime criterion parameter. As such, Applicants respectfully request the rejection of claim 1 be withdrawn. Claims 2-15 depend from claim 1, rendering them patentable also for at least the same reasons.

In rejecting claim 16, the Office has stated that "the limitation 'calculating a prime criterion parameter based on the optimization parameters and the signal characteristic value [*sic*]' is unclear of which optimization parameters are used for the calculation since there are 3 optimization parameters available."

Claim 16 has been amended to include a recitation "calculating a prime criterion parameter based on the minimum and maximum optimization parameters." Based on the same reasons set forth above, Applicants respectfully submit that claim 16 is patentable. Claims 17-25 depend from claim 16, rendering them also patentable for at least the same reasons.

Claims 27-30 depend from allowable claim 26. As such, Applicants respectfully request the rejection of claims 27-30 be withdrawn.

Conclusion

Based on the reasons as set forth above, Applicants respectfully request allowance of all pending claims.

In the event that there are any questions concerning this paper, or the application in general, the Examiner is respectfully urged to telephone Applicants' undersigned representative so that prosecution of the application may be expedited.

Respectfully submitted,

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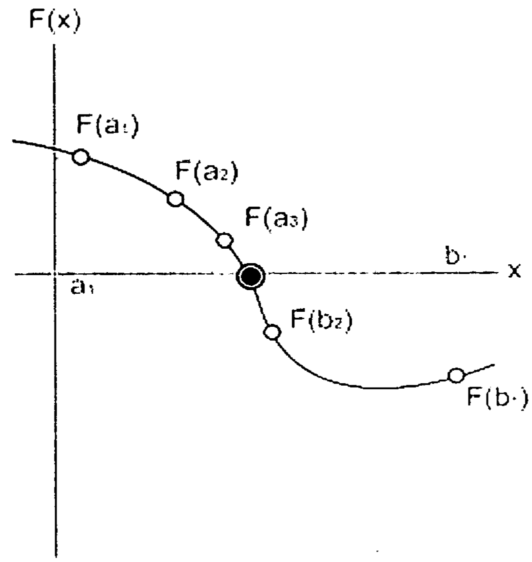
APPENDIX

A document that describes the bisection method has been attached. The document can be found at http://en.wikipedia.org/wiki/Bisection_method.

Bisection method

From Wikipedia, the free encyclopedia



A few steps of the bisection method applied over the starting range $[a_1;b_1]$. The red dot is the root of the function.

In mathematics, the **bisection method** is a root-finding algorithm which works by repeatedly dividing an interval in half and then selecting the subinterval in which the root exists.

Suppose we want to solve the equation $f(x) = 0$. Given two points a and b such that $f(a)$ and $f(b)$ have opposite signs, we know by the intermediate value theorem that f must have at least one root in the interval $[a, b]$. The bisection method divides the interval in two by computing $c = (a+b) / 2$. There are now two possibilities: either $f(a)$ and $f(c)$ have opposite signs, or $f(c)$ and $f(b)$ have opposite signs. The bisection algorithm is then applied to the sub-interval where the sign change occurs, meaning that the bisection algorithm is inherently recursive.

The bisection method is less efficient than Newton's method but it is much less prone to odd behavior.

If f is a continuous function on the interval $[a, b]$ and $f(a)f(b) < 0$, then the bisection method converges to a root of f. In fact, the absolute error for the bisection method is at most

$$\frac{|b-a|}{2^n}$$

after n steps. In other words, the error is halved at every step, so the method converges linearly, which is quite slow. On the positive side, the method is guaranteed to converge if f(a) and f(b) have different sign.

Pseudo-code

Here is a representation of the bisection method in Visual Basic code. The variables `xL` and `xR` correspond to a and b above. The initial `xL` and `xR` must be chosen so that `f(xL)` and `f(xR)` are of opposite sign (they 'bracket' a root). The variable `epsilon` specifies how precise the result will be.

```
'Bisection Method

'Start loop
Do While (xR - xL) > epsilon

  'Calculate midpoint of domain
  xM = (xR + xL) / 2

  'Find f(xM)
  If ((f(xL) * f(xM)) > 0) Then
    'Throw away left half
    xL = xM
  Else
    'Throw away right half
    xR = xM
  End If
```

```
Loop
```

External link

- Bisection Method (http://twt.mpei.ac.ru/mas/worksheets/Bisection.mcd) on Mathcad Application Server.

Reference

- Richard L. Burden, J. Douglas Faires (2000), "Numerical Analysis, (7th Ed)", Brooks/Cole. ISBN 0534382169.

Categories: Root-finding algorithms